

S/882/62/000/002/024/100
A057/A126

AUTHORS: Berlin, A.A., Severgin, Yu.M.

TITLE: A method for the preparation of polyacrylate esters


SOURCE: Sbornik izobreteniy; plastmassy i sinteticheskiye smoly. no. 2.
Kom. po delam izobr. i otkrytiy. Moscow, TsBII, 1962, 16 [Author's
certificate no. 129017, cl. 39c, 30 (appl. no. 624773 of April 10,
1959)]

TEXT: Products with increased mechanical strength can be obtained by re-
action of glycols with acrylic and saturated dicarboxylic acids containing a
sulfur atom in the hydrocarbon chain. 1 mole thioldivaleric acid, 2.2 mole meth-
acrylic acid, 2 mole diethylene glycol, p-toluenesulfonic acid (catalyst for the
esterification) in an amount of 4% of the sum of the weight of the preceding
components, thiodiphenylamine 0.2% of the quantity of methacrylic acid and 15%
toluene are mixed with 360 - 380 rpm at 112 - 115°C for 8 - 9 h. The evolved
reaction water is distilled as azeotropic mixture with toluene. The product ob-
tained is washed with 10 - 15% sodium chloride solution, neutralized with soda,

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washed, dried with calcinated sodium sulfate, and toluene is distilled off at 3 - 5 torr. A light-yellow transparent monomer dimethacrylatebisdiethyleneglycol-thiovalerianate is obtained with an 80 - 85% yield. This monomer is polymerized at 18 - 22°C in the presence of 1% of the complex initiation system $\text{DMAB}^+ \text{r}_2\text{O}_2^-$ ($\text{DMAV}^+ \text{r}_2\text{O}_2^-$) during 40 - 55 min. The yield of the polymer is 90%. 

[Abstracter's note: Complete translation]

Card 2/2

15.8520
15.9207

45189

S/882/62/000/002/068/100
A004/A126

AUTHORS: Berlin, A.A., Cherkashin, M.I., Sel'skaya, O.G., Limanov, V.Ye.
TITLE: A method of producing polymers
SOURCE: Sbornik izobreteniy; plastmassy i sinteticheskiye smoly. no. 2. Kom. po delam izobr. i otkrytiy. Moscow, TsBTI, 1962, 36 [Author's certificate no. 129330, Cl. 39b, 401 (appl. no. 626175 of April 21, 1959)]

TEXT: The authors suggest polymerizing aromatic compounds containing in the molecule not less than two acetylene groups. e.g., n-diethynylbenzene, or their mixtures with monoacetylene derivatives. Moreover, it is suggested to additionally heat-treat the polymers of arylacetylene at 300 - 400°C. The mixture consisting of 10 - 90 weight parts of phenylacetylene and 90 - 10 weight parts of n-diethynylbenzene (melting point 90°C) is copolymerized at 150 - 300°C. With a yield of up to 90 - 95%, infusible and insoluble copolymers of dark-brown (polymerization temperature 150°C) and black (polymerization temperature 300°C) color are formed. The copolymers have a low electric resistance and stand 10 - 15 h

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A method of producing polymers

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heating at a temperature of 450°-500° C. The suggestion makes it possible to obtain polymers that possess electric conductivity and an increased heat resistance.

[Abstracter's note: Complete translation]

Card 2/2

BERLIN, A.A.; KRONMAN, A.G.; YANOVSKIY, D.M.; KARGIN, V.A.

Materials of high resilience based on graft copolymers of
poly(vinyl chloride) with elastomers. Khim.prom. no.2:96-100
F '62. (MIRA 15:2)

(Vinyl compound polymers)
(Elastomers)

BERLIN, A.A.; VONSYATSKIY, V.A.

Induced reactivity of compounds with conjugate double bonds.
Izv.AN SSSR.Otd.khim.nauk no.7:1312-1313 J1 '62. (MIRA 15:7)

1. Institut khimicheskoy fiziki AN SSSR.
(Polymers—Spectra) (Conjugation (Chemistry))

BERLIN, A.A.; BASS, S.I.

Influence of "local activation" effect on the inhibiting
activity of aromatic hydrocarbons. Izv.AN SSSR.Otd.khim.nauk
no.8:1494 Ag '62. (MIRA 15:8)

1. Institut tonkoy khimicheskoy tekhnologii im. M.V.Lomonosova i
Institut khimicheskoy fiziki AN SSSR.
(Hydrocarbons) (Inhibition (Chemistry))

BERLIN, A.A.; BULACHEVA, S.F.; MOROZOV, Yu.L.

Chemistry and technology of synthetic polymers. Modification
of properties of polyethylene by the surface oxidation
method. Plast.massy no.10:3-5 '62. (MIRA 15:11)
(Polyethylene) (Oxidation)

BERLIN, A.A.; RAGIMOV, A.V.; LIOGON'KIY, B.I.

Polysulfophenylene quinones. Izv. AN SSSR.Otd.khim.nauk no.10:1863-1865
0 '62. (MIRA 15:10)

1. Institut khimicheskoy fiziki AN SSSR.
(Benzoquinone) (Benzidinesulfonic acid)

S/064/62/000/012/003/006
B119/B180

AUTHORS: Berlin, A. A., Kefeli, T. Ya., Korolev, G. V.

TITLE: Polymerizable oligomers

PERIODICAL: Khimicheskaya promyshlennost', no. 12, 1962, 12 - 22

TEXT: The article reviews Western and Soviet research work carried out between 1951 and 1962 on polymerizable oligomers. Special attention is paid to the synthesis and chemical properties of unsaturated oligoesters, oligomeric polybutadienes, and oligomeric polysiloxanes, and to the polymerization kinetics of oligomers in general. There are 54 references.

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44089

S/138/62/000/012/005/010

A051/A126

15 9/30

AUTHORS: Boguslavskiy, D. B., Shmurak, I. L., Borodushkina, Kh. N.,
Berlin, A. A., Uzina, R. V.

TITLE: The effect of active-polymer additions to case mixes on the
strength of adhesion in rubber-cord systems

PERIODICAL: Kauchuk i rezina, no. 12, 1962, 15 - 18

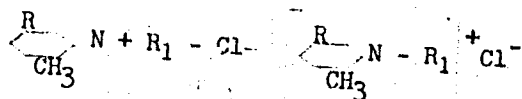
TEXT: The effect was studied of carboxyl-containing and methylvinylpyri-
dine rubber, and of chlorosulfopolyethylene polymer additions to case mixes
based on 100% butadiene-styrene oil-filled rubber on the adhesive strength of
systems with viscous cord saturated with various synthetic latexes. The intro-
duction of carboxyl-containing rubber into ECK (BSK) case mixes increases the
adhesive strength continuously in the systems with viscous cord saturated with
CKC -30-1 (SKS-30-1) and CKI-1 (SKD-1) latex compositions. Maximum adhesive
strength is obtained for rubbers, where the BSK is completely replaced by the
SKS-30-1 rubber. Additions of carboxyl-containing SKS-30-1 rubber affect the
adhesive strength of the rubber-cord even more in the case of cord saturated with

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A051/A126

methylvinyldipyrindine compositions. Obtained data showed that methylvinyldipyrindine latexes of high-temperature polymerization do not offer satisfactory adhesive strength of the cord to rubber, based on butadiene-styrene oil-filled rubber. The effectiveness of the additions increases with an increase in the carboxyl-group content in the adhesive, and pyridine-group content in the case rubber. Experimental results have led to the conclusion that a further increase of the adhesive strength of rubber to cord can be accomplished by introducing reactive groups into the adhesive and case mix which, in turn, increase the inter-molecular and chemical interaction at the contact region. Formation of a connection, at the contact region, such as:



in the case of combinations of pyridine adhesives and rubber containing additions of chlorosulfopolyethylene or other chloro-containing polymers, is assumed possible. Thus, it is further concluded that the use of an adhesive containing functional groups in combination with active additions in the case mixes leads

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A051/A126

to new possibilities for increasing the adhesive strength in rubber-cord systems.
There are 4 figures and 3 tables.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti i
Yaroslavskiy shinny zavod (Scientific Research Institute of the
Tire Industry and Yaroslavl' Tire Plant) ✓

Card 3/3

S/064/62/000/012/004/006
B119/B180

AUTHOR: Berlin, A. A.

TITLE: Some problems of the chemistry of polymers with a conjugate system

PERIODICAL: Khimicheskaya promyshlennost', no. 12, 1962, 23 - 38

TEXT: The article reviews Western and Soviet research work carried out between 1938 and 1962 on polymers with conjugate systems: synthesis and basic properties of polymers with alicyclic conjugate systems; with aromatic rings, hetero- and metallocycles, and sandwich structures in the conjugate chain; magnetic properties and local activation of compounds with delocalized π -electrons; reactivity of radicals and block copolymerization of compounds with conjugate systems; heat resistance and stabilizing effect of such compounds; catalytic activity of polymers. There are 98 references. ✓

Card 1/1

BERLIN, A.A.; KEFELI, T.Ya.; KOROLEV, G.V.

Polymerizable oligomers. Khim.prom. no.12:870-880 D '62.
(MIRA 16:2)

(Esters)
(Polymerization)

BERLIN, A.A.

Certain problems in the chemistry of polymers with a system of
conjugation. Khim.prom. no.12:881-896 D '62. (MIRA 16:2)

(Polymers)

(Conjugation (Chemistry))

11. 9200
11. 2219
15. 8150

34989
S/190/62/004/003/009/023
B110/B14'

AUTHORS: Berlin, A. A., Cherkashina, L. G., Balabancv, Ye. I.

TITLE: Polymers with the system of conjugated double bonds and heteroatoms in the conjugation chain. XX. Synthesis and examination of basic physicochemical properties of polymeric phthalocyanines

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 3, 1962, 376-382

TEXT: The synthesis and the structural dependence of electrical, magnetic, electron and ion exchange properties were studied in polymeric phthalocyanines on the basis of tetracarboxylic acids (pyro-mellithic acid (I) and 3,3',4,4'-tetracarboxy diphenyl ester (II)) and those consisting of mixtures of these acids with phthalic anhydride. A mixture of monomer and soluble polymer in dimethyl formamide was obtained at 180-210°C and a 1 : 3 : 3.6 ratio in the presence of CuCl and NH_4MoO_4 . The polymers from

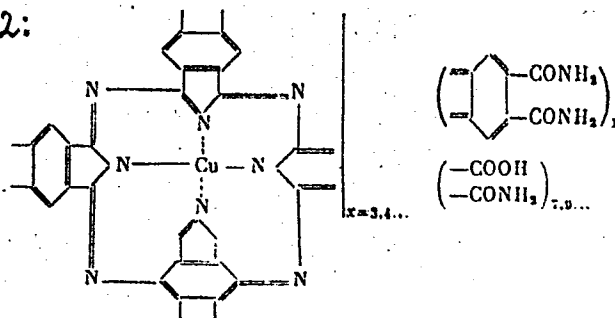
I and II consisted of two finely disperse, powdery, fractions. For I: II-1-H (P-1-N) and T-1-H (T-1-N) precipitable from dimethyl formamide by CHCl_3 ; and for II: unprecipitable II-1-P (P-1-R) and T-1-P (T-1-R). They
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were heated to 200-350°C/3 mm Hg to sublime impurities. H₂SO₄-resistant trimeric structures did not exist. Elementary analysis and equivalent weights found by potentiometric titration, showed P-2 and T-2 to be low-molecular and linearly arranged. The IR spectra of P-2 and T-2 showed bands of phthalocyanine and of primary carbonyl amine, C=O, and COOH groups. Hence:

P-2:

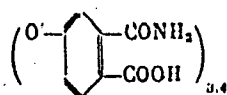
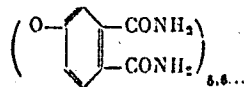
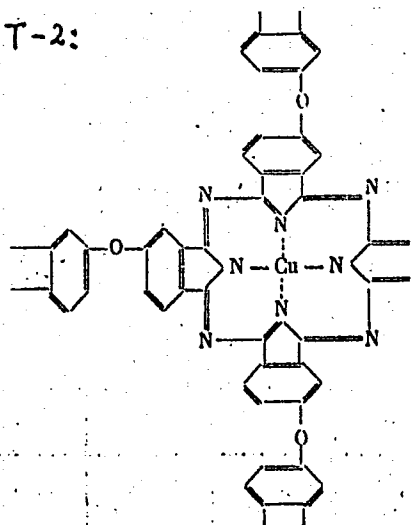


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Polymers with the system of ...

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T-2:



X=3,4...

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Polymers with the system of ...

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B110/B144

P-2 and T-2 are constant in air at $\leq 350^{\circ}\text{C}$. At 375°C , thermooxidative destruction in T-2 is more intensive than in P-2 owing to the oxygen bridges contained in the former. The magnetic susceptibilities χ for P-2 at $H = 3500, 4000, 4500$ oe were $2.0 \cdot 10^{-6}$, $1.9 \cdot 10^{-6}$, and $1.8 \cdot 10^{-6}$ cgsu, respectively, and $\chi = 2.1 \cdot 10^{-6}$, $1.9 \cdot 10^{-6}$, and $1.75 \cdot 10^{-6}$ cgsu for T-2. Polyphthalocyanines have comparatively broad epr bands of high intensity with a distance of 100-150 oe between their maxima, and a g -factor of ≈ 2.025 . The conductivity was measured with an ЭМУ-2 (EMU-2) amplifier at $20-200^{\circ}\text{C}$ and $< 10^{-17} \text{ ohm}^{-1}\text{cm}^{-1}$ and at $\leq 3 \text{ kv/cm}$. The conductivity $\sigma_{300^{\circ}\text{K}}$ of P-1-N ($200-350^{\circ}\text{C}/3 \text{ mm Hg}$) subjected to heat treatment increases from 10^{-10} to 10^{-8} . The intensity of epr spectra for P-1-N and T-1-N increases. Reprecipitation of polyphthalocyanines from concentrated H_2SO_4 increased their conductivity and the intensity of epr signals. The correlation between epr signal indications and conductivity is explained as follows: "Nonactivated conductivity" exists in the "ordered regions" with broad epr bands. Transitions between these regions require activation energy. There are 4 figures and 2 tables. The most important reference to English-language publications reads as follows: W. D. Drinkard, J. C. Bailar, J. Card 4/5

Polymers with the system of ...

S/190/62/004/003/009/023
B110/B144

Amer. Chem. Soc., 81, 4795, 1959.

ASSOCIATION: Institut khimicheskoy fiziki (Institute of Chemical Physics)

SUBMITTED: February 22, 1961

X

Card 5/5

53200

15.8690

26259

S/190/62/004/004/005/019

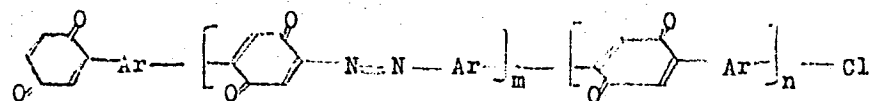
B119/B138

AUTHORS: Parini, V. P., Kazakova, Z. S., Okorokova, M. N., Berlin, A.A.

TITLE: Polymers with conjugate bonds and heteroatoms in the conjugate chain. XXII. Products of the reaction of bis-diazo compounds with quinones

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 4, 1962, 510-515

TEXT: The reaction of p-benzoquinone with bis-diazo compounds of p-phenylene diamine, benzidine, and benzidine-3,3'-dicarboxylic acid was studied. For each of the two latter compounds the reaction was conducted in two variants: (1) with neutralization of the released HCl by sodium acetate; (2) without neutralization. Five polymers of the proposed general formula



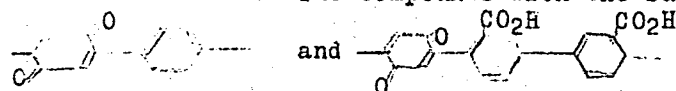
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X

Polymers with conjugate bonds and ...

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B119/B138

were obtained (Ar is the aromatic group corresponding to the initial product). The compounds contain 5-15 benzene nuclei per molecule (estimated molecular weight 500-1500). The nitrogen content of the polymers, which depends on the acidity of the reaction medium, is 0.55 (with neutralization) to 11.6%. The compounds are heat resistant (3% loss of weight at 300°C) have electron exchange properties, and emit epr signals with an integral intensity of around $10^{18} - 10^{20}$ paramagnetic particles per gram. At 25°C the electrical conductivity is 10^{-10} to $10^{-20} \text{ ohm}^{-1} \cdot \text{cm}^{-1}$. The compounds with the fundamental molecules



react with heavy metal salts (solution in dimethyl formamide) to give insoluble compounds, probably with formation of cross-linked chelate structures. There are 1 figure and 2 tables. The most important English-language reference is: D. E. Kvalnes, J. Amer. Chem. Soc., 56, 2478, 1934.

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Polymers with conjugate bonds and ...

S/190/62/004/004/005/019
B119/B138

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AS USSR). Vsesoyuznyy zaochnyy institut tekstil'noy i legkoy promyshlennosti (All-Union Correspondence Institute of the Textile and Light Industries)

SUBMITTED: March 9, 1961

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X

37430

S/190/62/004/005/006/026
B110/B144

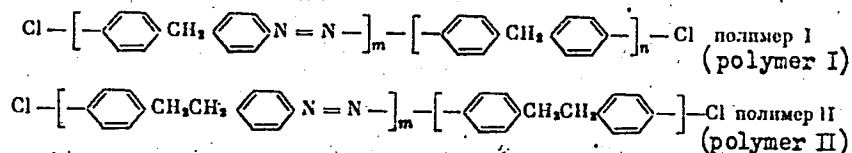
15.8540

AUTHORS: Berlin, A. A., Liogon'kiy, B. I., Parini, V. P., Leykina, M. S.

TITLE: Polymers with conjugate bonds and a heteroatom in the conjugate chain. XXIV. Synthesis and study of the properties of linear aromatic polymers with methylene groups between the benzene rings

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 5, 1962, 662-669

TEXT: Bis-diazotized 4,4'-diamino-diphenyl methane and 4,4'-diamino-dibenzyl were converted into the linear polymers



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by an ammoniacal solution of univalent copper in Ar atmosphere at 0°C. They were light-brown powders insoluble in ordinary organic substances, soluble in benzene, pyridine, quinoline, and dimethyl formamide, with the molecular weights $M_{PI} = 1250$ and $M_{PII} = 2600$. The almost normal

viscosity proves the macromolecular chain to be very flexible. The molecular weight of II is higher, since the two methylene groups between the benzene rings (1) reduce the electron dislocation, and (2) effect a slower decrease of the radical activity on recombination. The slight loss in weight when heating after evacuation is based on: (1) distillation or decomposition of low-molecular impurities, and (2) inhibition of the decomposition of the high-molecular product. The epr spectra of I and II show two signals with the g-factors 2.00 (a) and 2.06 (b), respectively, where a consists of a narrow signal (6-8 oersteds) and a wide signal (50 oersteds) which is caused by the poorly active, free radicals remaining in the polymer. b is a triplet (25 oersteds) caused by low-molecular biradicals. The decrease of the degree of conjugation in the polymer chain is explained by a decrease in integral concentration of paramagnetic particles per g of substance and by the intensity of the

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Polymers with conjugate bonds ...

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narrow signal as compared to polyazophenylenes: Measurement of the electrical conductivity yielded for I: $E = 1.7 \text{ eV}$, $\sigma_0 = 10^{12} \text{ ohm}^{-1} \cdot \text{cm}^{-1}$, $\sigma_{300^\circ\text{K}} = 10^{-16} \text{ ohm}^{-1} \cdot \text{cm}^{-1}$, $\sigma_{600^\circ\text{K}} = 10^{-2} \text{ ohm}^{-1} \cdot \text{cm}^{-1}$. For II, $\log \sigma = f(1/T)$ between 300 and 370°K was a curve whose angle of inclination approached $\pi/2$ as the temperature rose. Introduction of one or two CH_2 or NH groups thus causes a steep increase in the temperature dependence of the conductivity. The conductivity of these polymers will be high at high temperatures owing to the considerable heat resistance of I and II at 300-350°C. There are 3 figures and 4 tables.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AS USSR)

SUBMITTED: March 23, 1961

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38286

S/190/62/004/006/012/026
B110/B138

15.8150

AUTHORS: Berlin, A. A., Matveyeva, N. G., Sherle, A. I.,
Kostrova, N. D.

TITLE: Polymers with conjugate bonds and heteroatoms in the conjugate chains. XXI. Polymeric complexes of tetraethylene cyanide

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 6, 1962, 860-868

TEXT: The preparation of polymers from tetraethylene cyanide and metals or metal salts was studied because: (1) tetraethylene cyanide has a planar structure, which permits conjugation via nitrile groups; (2) it shows four nitrile groups on two carbon atoms, and may form cyclic structures with and without metal atoms; (3) polymers obtained from it and the metals have so far been the only "inorganic" macromolecular compounds with directly bonded carbon, nitrogen and metals; and (4) because of the high vapor tension and heat stability of the monomer polymer complexes can be formed directly on the metal surface (Cu, Fe, Ni, Al etc). Black films which were insoluble in organic, alkaline, and

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Polymers with conjugate bonds...

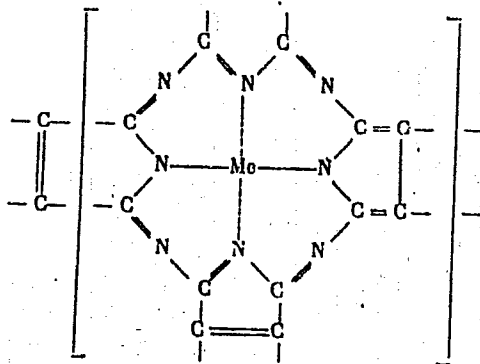
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B110/B138

acidic substances were obtained here after 5 - 20 hr at 150 - 450°C. The black, infusible, hygroscopic polymers obtained from tetraethylene cyanide and copper acetylacetonate (2:1) were insoluble in common organic substances, variously soluble in dimethyl formamide, pyridine, triethanolamine and concentrated H_2SO_4 . The IR spectra of the films obtained from tetraethylene cyanide and copper showed a background at 700 - 1800 cm^{-1} which is typical for built-up or planar polymers with conjugate bonds. Polymers from copper acetylacetonate showed a wide asymmetric absorption band at 1700 - 1400 cm^{-1} . For all polymers the absorption maximum lies at $\sim 2210\text{ }cm^{-1}$, which corresponded to the $C\equiv N$ bond. The intensive background confirmed the strongly branched system of the conjugate bonds. The degree of order depends on conditions of synthesis. Polymers obtained from copper acetylacetonate showed abnormal η/c dependence on c, similar to polyphenylenes and polyazophenylenes. The presence of neighboring $C\equiv N$ groups points to the formation of energetically favorable, flat azopor-phin structures with or without chelate-like bonded metals.

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Polymers with conjugate bonds...

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Polymers obtained from metals had much higher heat stability than those obtained from copper acetylacetonate, since the acetylacetonate groups bonded to a metal of different valences initiate chain decomposition into peroxide radicals. The magnetic susceptibility depends on the flux density and temperature, and is higher ($\chi = 1.03 \cdot 10^{-5}$ CGSM) (20°C, 3500

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oersted) for a polymer obtained from acetylacetonate in absence of the solvent than for one obtained in the presence of cyclohexanone. The dependence of $\log \rho$ on $1/T$ is linear for all polymers. The conductivities are 10^{-5} to $10^{-12} \text{ ohm}^{-1} \cdot \text{cm}^{-1}$, the activation energy $E = 10 - 15 \text{ kcal/mole}$. There are 5 figures and 4 tables. ✓

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AS USSR)

SUBMITTED: April 8, 1961

Card 4/4

38890

S/190/62/004/007/003/009
B145/B180

11. 2210

AUTHORS: El'tsefon, B. S., Berlin, A. A.

TITLE: Investigation into the mechanochemistry of polymers.
XIII. Effect of the volume of irradiated samples on the
kinetics of ultrasonic destruction of polystyrene

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 7, 1962,
1033-1041

TEXT: No papers have hitherto been published on this problem of ultrasonic
destruction. Apparatus and procedure have already been described
(A. A. Berlin, B. S. El'tsefon, Vysokomolek. soyed., 1, 688, 1959;
A. K. Burov, Akust. zh., 4, 315, 1958). The authors used a YAG-100
(UAG-100) oscillator with frequency of 1.5 Mc/sec, intensity

50 kw/cm² and energy density of 4.5-45 kw/g, with solutions of 0.1 g
polystyrene (polymerization coefficient: 8120) in 100 ml benzene. The
volume v was 10-100 cm³, the height of the column of liquid was 11-110 cm.
For the initial period of destruction, the rate constant k was independent

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Investigation into the...

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of the chain length at all v values. k is proportional to the acoustic energy density $U/v \cdot c$ (where U is the acoustic power added, and c is the concentration of the solution) and to the reciprocal values of v and the height of the column of liquid. The relation

$$P = P_0 e^{-k_1 t}$$

is valid where P = mean viscosimetric polymerization coefficient. The relation $1/P - 1/P_0 = k_1 t$ holds for $v = 10, 15, 20, 30 \text{ cm}^3$ within the density range of $1.5 \cdot 10^3 \text{ w/g}$ at 30 cm^3 to $4.5 \cdot 10^3 \text{ w/g}$ at 10 cm^3 and also for the polymerization coefficients from 2.5 to $\sim 4.5 \cdot 10^3$. k_1 showed no linear dependence on $U/v \cdot c$, but increased with energy density. Extrapolation for 0 yielded the lowest density at which k_1 starts being linearly dependent on P . For $v = 40, 60$, and 100 cm^3 the following dependence of the rate constant on P was found,

$$P = P_0 / \sqrt{1 + 2\beta(P_0)^2 k_2 t}.$$

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Investigation into the...

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In the coordinates $(P_0/P)^2 - 1$, t , curves with two linear sections were obtained for all three volumes. The results confirm the importance of the q -factor ($q = Ut/vc$), which was introduced in a previous paper, for the investigation of the ultrasonic destruction of polymers. There are 6 figures and 2 tables. The English-language reference is:
I. Sakurada, Chem. High Polymers. Japan, 2, 253, 1945.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AS USSR)

SUBMITTED: April 20, 1961

Card 3/3

39848

5.3832

S/190/62/004/008/007/016
B101/B180

AUTHORS: Berlin, A. A., Popova, Z. V., Yanovskiy, D. M.

TITLE: Polymers with conjugate bonds in the macromolecular chains.
XXIV. Effect of polymers with conjugate bonds on the
stability of polyvinyl chloride .

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 8, 1962,
1172-1177

TEXT: The authors studied the inhibiting effects of polyphenyl acetylene (I), a copolymer of phenyl acetylene with p-diethynyl benzene (II), and a thermal dehydrochlorination product of polyvinyl chloride (PVC) (III) on the thermal decomposition of PVC. Decomposition temperature, induction period and rate of HCl liberation were measured (methods see Zh. prikl. khimii, 33, 186, 1960). PVC without inhibitor was completely dehydrochlorinated after 60 min. at 300°C in vacuo. It was found, that the inhibiting effect (1) depends on concentration and temperature; (2) diminishes in the order I > III > II; (3) is greater with I than with lead stearate, dibutyl lead maleinate, or ethyl resorcinol. On adding 1%

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Polymers with conjugate bonds ...

S/190/62/004/008/007/016
B101/B180

of any of these substances the amounts of HCl (mg/g PVC) liberated after 3 hrs at 175°C were around 8.5, 8.5, 6.5, and 5, respectively; (4) I inhibits thermal decomposition of PVC at 185°C, without acceleration at 195°C which does, however, occur with III, due to the active radicals present in III. The effect of such radicals was confirmed: when heated to above 300°C I lost its inhibiting effect and initiated thermal decomposition. (5) I only stabilizes PVC against thermal effects, not against light. There are 2 figures and 4 tables. The English-language reference is: D. E. Winkler, J. Polymer Sci., 35, 3, 1959.

SUBMITTED: May 8, 1961

Card 2/2

5.3832

39851

S/190/62/004/008/012/016
B101/B138

AUTHORS: Liogon'kiy, B. I., Moshkovskiy, Yu. Sh., Parini, V. P.,
Berlin, A. A.

TITLE: Infrared spectra of some aromatic polymers

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 8, 1962,
1241-1248

TEXT: The IR spectra of the following linear polymers synthesized previously (see Vysokomolek. soyed., 2, 689, 1494, 1960; 3, 1491, 1961; 4, 662, 1962), were examined in order to ascertain their structure:

$\text{Cl}-\left[\text{C}_6\text{H}_5-\underset{\text{R}}{\text{C}}_6\text{H}_5\right]_m-\left[\text{N}=\text{N}-\underset{\text{R}}{\text{C}}_6\text{H}_5-\underset{\text{R}}{\text{C}}_6\text{H}_5\right]_n-\text{Cl}$, where R = H (I), $\cdot\text{CH}_3$ (II), or COOH (III); a block-copolymer of I with p-diethynyl benzene; the copper chelate compound of III; $\text{F}-\left[\text{C}_6\text{H}_5-\underset{\text{R}}{\text{C}}_6\text{H}_5\right]_m-\left[\text{N}=\text{N}-\underset{\text{R}}{\text{C}}_6\text{H}_5-\underset{\text{R}}{\text{C}}_6\text{H}_5\right]_n-\text{F}$; $-\left[\text{C}_6\text{H}_5-\underset{\text{R}}{\text{C}}_6\text{H}_5\right]_m-\left[\text{N}=\text{N}-\underset{\text{R}}{\text{C}}_6\text{H}_5-\underset{\text{R}}{\text{C}}_6\text{H}_5\right]_n-$ with $-\text{O}-\text{CO}-\text{CH}_3$ or OH groups at the end;

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Infrared spectra of some aromatic ...

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$\text{Cl}-[\text{C}_6\text{H}_5-\text{CH}_2-\text{C}_6\text{H}_5]_m-\text{N}=\text{N}-\text{C}_6\text{H}_5-\text{CH}_2-\text{C}_6\text{H}_5]_n-\text{Cl}$; $\text{Cl}-[\text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\text{C}_6\text{H}_5]_m-$
 $-\text{N}=\text{N}-\text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\text{C}_6\text{H}_5]_n-\text{Cl}$; $-\text{C}_6\text{H}_5-\text{C}_6\text{H}_5-\text{N}=\text{N}-\text{NH}-]_n-\text{C}_6\text{H}_5-\text{C}_6\text{H}_5-$.

Results: (1) Quinoid structures occur in polymers with continuous conjugate chains. The introduction of substituents (CH_3 , COOH) or chain links ($-\text{CH}_2-$, $-\text{CH}_2-\text{CH}_2-$, $-\text{N}=\text{N}-\text{NH}-$) disturbs the coplanarity of the molecule and reduces the proportion of quinoid structures. (2) In polymers the ionization of the carboxyl groups increases with molecular weight. (3) The formation of a three-dimensional structure with a continuous system of conjugated bonds is characterized by a continuous background in the whole spectral region studied, and by the absence of noticeable absorption bands. There are 3 figures. The most important English-language references are: L.E. Stewart, M. Hellmann, J. Res. Nat. Bur. Standards, 60, 125, 1958; K. Ueno, J. Amer. Chem. Soc., 79, 5205, 1957; K. S. Tetlow, Research, 3, 187, 1950.

Card 2/3

Infrared spectra of some aromatic ...

S/190/62/004/008/012/016
B101/B138

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical
Physics of the AS USSR)

SUBMITTED: May 19, 1961

Card 3/3

8/190/62/004/010/008/010
B101/B186

AUTHORS: Korolev, G. V., Berlin, A. A., Kefeli, T. Ya.

TITLE: Polymerization in highly viscous media, and three-dimensional polymerization. II. Study of the initial polymerization stage of polyacrylate esters

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 10, 1962, 1520-1527

TEXT: The effect of the viscosity of the medium on the initial polymerization rate w_0 and on the constant k_t of chain termination in polyacrylate esters was studied. Polymerization took place at 50°C and 0.5% by weight of dicyclohexyl peroxy-dicarbonate (I) in bulk, in benzene solution and in highly viscous II; w_0 was measured by methods described previously (Author's certificate no. 137304, class 421, 335, Byulleten' izobreteniy, 1961, no. 7). The following data were found:

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Oligomer or monomer	Viscosity at 25°, cst	$\eta_{sp} \cdot 10^{-2} \cdot \text{min}^{-1}$ in bulk 50% II 75% II			kt, l/mole·sec (I in bulk
III	10	3	5	8	$2.3 \cdot 10^6$
IV	95	7	9.8		$3.6 \cdot 10^5$
V	60	4	4.3	8	$1.9 \cdot 10^6$
VI	1000	17.5	14		$1.4 \cdot 10^5$
VII	115	5	6	8	$6.4 \cdot 10^5$
VIII	55	3		7.5	$2.3 \cdot 10^6$
IX		0.75	1	1.2 ⁺	$4.0 \cdot 10^7$

+) 80% II. II = IDF-2 dimer consisting of diethylene glycol, phthalic acid, and isobutyric acid, which is not capable of radical-chain polymerization and has a viscosity of 800-900 cst; III = TGM-3, dimethacrylate triethylene glycol; IV = MGF-9, dimethacrylate-(bis-tri-

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Polymerization in highly viscous ...

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ethylene glycol)-phthalate; V = MDF-1, methacrylate-diethylene glycol phthalate; VI = MDF-2 methacrylate-(bis-diethylene glycol)-phthalate; VII = MBF-1, methacrylate-butanediol phthalate; VIII = MDA-1, methacrylate-diethylene glycol adipate; IX = MMA, methyl methacrylate. The dependence of w_0 on the viscosity proves the chain termination to take place in the diffusion region. Conclusions: (a) At low-degree conversion, the constant k_g of chain growth hardly depends on the length of the oligomer chain, except in the cases of steric hindrance occurring for example in high telomers; (b) k_t decreases considerably as the viscosity of the medium increases; (c) with equal viscosity, k_t hardly depends on type and length of the oligomer chain. The apparent difference in polymerizability of the compounds studied, is thus caused by the difference in viscosity of the medium. For III - VIII, k_t was $(3-4) \cdot 10^5$ l/mole·sec in 75% II, whereas for IX, k_t was $\approx 10^7$ in 80% II. This is explained by the different diffusion coefficients in the esterification of methacrylic acid with CH_3 or with a long oligomer chain. The experimental determination of w_0 at different concentrations of I yielded $w_0 \sim [I]^{0.5}$ according to

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Polymerization in highly viscous ...

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the reaction $I \xrightarrow{w_1} R_1$; $R_1 + M \xrightarrow{k_s} R_1$; $R_1 + M \xrightarrow{k_s} R_1$; $R_1 + R_1 \xrightarrow{k_t}$ recombination product, where M = oligomer. The constant k_o of peroxide decomposition was determined from $\log[M]_t/w_t = \log[M]_o/w_o + 0.217 k_o t$, where $[M]_o$ is the initial, and $[M]_t$ the present concentration of the monomer. For I, k_o was found to be $9.8 \cdot 10^{-5} \text{ sec}^{-1}$, which is similar to the value of k_o in benzene. Hence, the length of the oligomer chain affects k_o but slightly. There are 2 figures and 1 table.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AS USSR)

SUBMITTED: June 19, 1967

Card 4/4

S/190/62/004/011/004/014
B119/B186

AUTHORS: Korolev, G. V., Berlin, A. A.

TITLE: Polymerization in highly viscous media and threedimensional polymerization. III. Mechanism of self-acceleration in the initial and intermediate stages of polymerization of polyacrylates

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 11, 1962, 1654 - 1659

TEXT: The mechanism that underlies threedimensional polymerization of polyacrylates is explained by studies of reaction systems and kinetics and by reference to published data. The formation of the intensely branched and crosslinked polymer structure in the initial and intermediate stages of the reaction is likewise explained. It is assumed that those of the primary polymer chains which are long enough become coiled, forming microregions within which the liquid monomer is immobilized and, therefore, polymerize much more quickly in all directions than when freely mobile in the pure liquid phase. Taking into account this effect, the kinetic equation $w/[M] = w_0 + a\Gamma$ (w_0 - initial rate of polymerization, Card 1/2

Polymerization in highly...

S/190/62/004/011/004/014
B119/B186

w = current rate of polymerization, $[M]$ = current concentration of oligomer, Γ = degree of conversion, a = constant) was derived which was in good agreement with the experimental results. Polymerization of dimethacrylate triethylene glycol in the form of 5 - 10% solutions in triethylene glycol, which proved to be a relatively active transfer agent, led to the production of weakly branched, soluble and fusible thermosetting β -polymers, m.p. 80 - 90°C, in a yield of 70 - 90%. There are 2 figures. ✓

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AS USSR)

SUBMITTED: June 19, 1961

Card 2/2

BASIN, V.Ye.; BERLIN, A.A.; UZINA, R.V.

Effect of the compatibility of adhesive polymers with casing rubber on the adhesive strength of rubber-cord systems. Kauch.i rez. 21 no.9:12-17 S '62. (MIRA 15:11)

1. Nauchno-issledovatel'skiy institut shinnoy promyshlennosti.
(Adhesion) (Polymers) (Tire fabrics)

BOGUSLAVSKIY, D.B.; SEMURAK, I.G.; BORODUSHKINA, Kh.N.; BERLIN, A.A.;
UZINA, R.V.

Effect of active polymer additives to the carcass mixtures on
the strength of the bond in rubber-cord systems. Kauch.i rez.
21 no.12:15-18 D '62. (MIRA 16:2)

1. Nauchno-issledovatel'skiy institut shinnoy promyshlennosti i
Yaroslavskiy shinnyy zavod.
(Tire fabrics--Testing)

32838

158170 1581

S/020/62/142/002/019/029
B106/B101

AUTHORS: Berlin, A. A., Baranovskaya, N. B., Mizikin, A. I., and
Sukhov, V. A.

TITLE: Degradation and structuralization of polydimethyl siloxane
(PDMS) under thermal action

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 2, 1962, 351-353

TEXT: The primary thermal cracking of polymeric materials begins on the weakest macromolecular bonds. These bonds may form at the insertion points of the initiator, of oxygen, of molecules of additions and regulators, etc. The possibility of increasing the thermal stability of polymers by removing the weak bonds was examined under conditions preventing or rendering difficult the development of a chain reaction of the thermal disintegration of macromolecules. The investigation was conducted on polydimethyl siloxane rubber whose vulcanized products decompose considerably when heated to 200°C under exclusion of air. The rubber (mean molecular weight 40 - 50·10⁴) was stirred to a paste, using an inorganic filler and benzoyl peroxide, and was then filled into ~2 mm Card 1/4

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B106/B101

high metallic molds. These molds were hermetically sealed and heated to 150 - 350°C. A few molds were taken out after given time intervals, and the hardness and mechanical stability of the samples were determined. As is shown by the results, the supply of thermal energy to the polymer under exclusion of air (i. e., in the absence of an initiator of a destructive chain reaction) permits a rearrangement of the polymer structure. The macromolecules formed in the process display less "weak bonds" and are therefore thermally more stable. This rearrangement is a radical process, and basically consists of three reactions: (1) molecular destruction of the initial polymer on the weakest bonds under formation of macroradicals; (2) chain transfer through the forming macroradicals; (3) structuralization of the system by the recombination of the macroradicals under development of bonds being sufficiently stable against heat treatment. Two conversion stages, differing sharply from each other, and characterized by the predominance of the reactions (1) and (2) or the reaction (3) take place successively in the heat treatment of polydimethyl siloxane rubber under exclusion of air. In the first stage, tensile strength and Shore hardness drop, and rise again in the subsequent second stage. The rates of drop and subsequent rise of the

X

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Degradation and structuralization...

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B106/B101

said stability characteristics are increased to about the same extent with an increase of temperature. The structuralization is preceded by a longer or shorter induction period which is possibly due to the relatively high viscosity of the system, by which the reaction between the macro-radicals is rendered more difficult. It is concluded that the above-described strength regeneration with heat treatment under exclusion of air is generally possible in polymers with relatively flexible chains and weak cross-linking effected by bridge bonds. By the above-described rearrangement of the polymer structure combined with the use of efficient stabilizers it should be possible to approach the temperature limit of exploitation closely to the theoretical value (500 - 800°C) which is chiefly dependent on the strength of covalent bonds in the macromolecules. The use of stabilizers alone is not sufficient for this purpose. There are 4 figures.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: June 24, 1961, by V. N. Kondrat'yev, Academician
Card 3/4

Degradation and structuralization...

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S/020/62/142/002/019/029
B106/B101

SUBMITTED: June 19, 1961

X

Card 4/4

DULOV, A.A.; SLINKIN, A.A.; LIOGON'SKIY, B.I.; RUBINSHTEYN, A.M.;
Prinimal uchastiye BERLIN, A.A.

Conjugation and orderliness as factors affecting semiconducting
properties of polymers. Dokl. AN SSSR 143 no.6:1355-1357 Ap
'62. (MIRA 15:4)

1. Institut organicheskoy khimii im. N.D.Zelinskogo AN SSSR i
Institut khimicheskoy fiziki AN SSSR. Predstavleno akademikom
B.A.Kazanskim.

(Polymers) (Semiconductors) (Chemical structure)

38611

S/020/62/144/005/007/017
B106/B138

15.8050

AUTHORS: Berlin, A. A., Aseyeva, R. M., Kalyayev, G. I., and
Frankevich, Ye. L.

TITLE: Oxidation products of high-molecular conjugate polyenes

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 5, 1962, 1042-1045

TEXT: The authors studied the mechanism of mild oxidation (20°C) of high-molecular acyclic polyenes with oxygen, and the reactivity and dehydrogenating effect of oxidation products. Polyenes were prepared by dehydrochlorinating polyvinyl chloride (PVC; molecular weight: 650000) and perchlorovinyl (CPVC; molecular weight: 105000) with a sodium amylate excess in an argon atmosphere. With PVC, alkoxylation occurs as a side reaction disturbing the continuous conjugation of double bonds in the chain. The CPVC dehydrochlorination is incomplete and yields polyenes containing up to 20% bound chlorine. Dehydrochlorinated polymers are black, insoluble, brittle, and do not soften below the temperature of destruction ($400-500^{\circ}\text{C}$). According to their e.p.r. spectra they contain 10^{18} paramagnetic particles per g. Under oxidation at 20°C , which is

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Oxidation products of high- ...

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considerably accelerated exposure to light, the dehydrochlorinated PVC and CPVC samples turn light yellow and the e.p.r. signals disappear. Dehydrochlorinated PVC oxidizes more rapidly and absorbs more O_2 than the CPVC. The loss of conjugation in the system owing to O_2 addition reduces the electrical conductivity of the polymer considerably, and more rapidly with the PVC than the CPVC. Dehydrochlorinated PVC completely oxidized under the conditions chosen, contains approximately 32.5% bound oxygen, mainly in the peroxy groups. The oxidation seems to be:

$$-\text{CH}=\text{CH}-\text{CH}=\text{CH}- \xrightarrow[\text{E, } h\nu]{\text{O}_2} \text{---} \underset{\text{O}=\text{O}}{\text{CH}-\text{CH}=\text{CH}-\text{CH}} \text{---}.$$

When heated at $\geq 150-200^\circ\text{C}$ without

air, these peroxides turn dark and change into new polymers containing only $\leq 15\%$ bound O_2 . Mass spectrometric analyses of gaseous products forming during this conversion suggest that thermal treatment decomposes the peroxide with ring formation of acyclic into aromatic structures. Heating in air causes, not progressive destruction, but some increase in thermostability with continued thermal treatment. Absence of continuous conjugation in the peroxides makes the macromolecules very flexible and reduces their ability to form intermolecular π -complexes. Above $70^\circ C$, the oxidized polymer is highly elastic. At elevated temperatures three

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Oxidation products of high- ...

S/020/62/144/005/007/017
B106/B138

dimensional structures form. Samples pressed at 150°C are no longer highly elastic. Compression of oxidized polyvinylene at 150-250°C and a pressure of 300-500 kgf/cm² yields stable plastics of great thermostability. The use of the peroxides of high-molecular polyenes as binding agent, frequently improves the electrical properties of the material concerned, apparently owing to oxidative dehydrogenation of the saturated groups disturbing continuous conjugation in the polymer components. There are 4 figures and 1 table. The English-language reference is: M. Hatano, S. Kambara, S. Okamoto, J. Polym. Sci., 51, no. 156, 526 (1961).

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: February 28, 1962, by V. N. Kondrat'yev, Academician

SUBMITTED: January 15, 1962

Card 3/3

BERLIN, A.A.; VONSYATSKIY, V.A.; LIOGON'KIY, B.I.

Quasiradical block polymerization. Dokl. AN SSSR. 144 no.6:1316-1319 Je '62. (MIRA 15:6)

1. Institut khimicheskoy fiziki Akademii nauk SSSR. Predstavleno akad. V.N.Kondrat'yevym.
(Polymerization)

LEVINA, S.D.; LOBANOVA, K.P.; BERLIN, A.A.; SHERLE, A.I.

Electric properties of the systems consisting of tetracyanoethylene
and metal powders. Dokl.AN SSSR 145 no.3:602-604 J1 '62.
(MIRA 15:7)

1. Institut elektrokhemii AN SSSR. Predstavleno akademikom
A.N.Frumkinym.

(Ethylene) (Metals)

ACCESSION NR. AT4033983

8/0000/63/000/000/0053/0058

AUTHOR: Berlin, A. A.; Kostroma, T. V.

TITLE: Polymers with conjugated bonds and hetero atoms in the conjugated chain. XXXVI. Chelate polymers of salicyl derivatives of ferrocene

SOURCE: Geterotsepnny*ye vy*sokomolekulyarny*ye soyedineniya (Heterochain macromolecular compounds); sbornik statey. Moscow, Izd-vo "Nauka," 1963, 53-58

TOPIC TAGS: organic semiconductor, semiconducting polymer, salicylferrocene, disalicylferrocene, tetrasalicylferrocene, chelate polymer

ABSTRACT: New semiconducting salicyl derivatives of ferrocene were prepared at the Institut khimicheskoy fiziki, Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences USSR). The following were synthesized: mono- to penta- salicylferrocenes

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ACCESSION NR. AT4033985

as well as chelate polymers of tetrasalicylferrocene (TSF) with Cu, Be, Fe(II), Fe(III), Al, or Mg, and chelate polymers of disalicylferrocene (DSF) with Ag or Cu. Some monomeric chelates were also prepared. The di- to penta-salicylferrocenes were prepared by reacting ferrocene with a diazonium salt of p-aminosalicylic acid in sulfuric acid solution. After isolation, the salicylferrocenes were separated by fractional extraction. Monomeric and polymeric chelates were prepared from fractions containing mostly DSF or TSF by reacting solutions of the DSF or TSF with metal acetylacetonates or with metal salt solutions at about room temperature. Obtained in high yields (64--99%) were monomeric chelates of DSF with Ag or Cu and chelate polymers of TSF with Cu, Mg, Al, Be, Fe(II), or Fe(III). The chelate polymers were infusible black powders which were insoluble in organic solvents, and decomposed upon treatment with NaOH or other alkali. The thermal stability of the polymers was highest for Be, Mg, and Al chelates, which withstand 200°C without significant weight losses; it was lowest for Cu chelates, which show a 30% weight loss at 200°C for 5 hr. The chelate polymers showed higher

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ACCESSION NR. AT4033985

electrical conductivity and magnetic susceptibility than the DSF or TSP monomers. For example, conductivity, at 20°C is $2.1 \cdot 10^{-6} \text{ ohm}^{-1} \text{ cm}^{-1}$ for the DSF-Cu²⁺ chelate and $2.0 \cdot 10^{-6} \text{ ohm}^{-1} \text{ cm}^{-1}$ for DSF. The chelate polymers give a narrow EPR signal. Orig. art. has: 2 figures, 3 tables, and 1 formula:

ASSOCIATION: none

SUBMITTED: 24May62

DATE ACQ: 30Apr64

ENCL: 00

SUB CODE: CH,PH

NO REF SOV: 004

OTHER: 002

Card 3/3

ACCESSION NR: AT4033997

S/0000/63/000/000/0134/0138

AUTHOR: Berlin, A. A.; Llogon'kiy, B. I.; Parini, V. P.

TITLE: Synthesis and properties of a polymer from 4,4'-biphenylbisdiazonium tetrafluoroborate

SOURCE: Geterotsepnny*ye vy*sokomolekulyarny*ye soyedineniya (Heterochain macromolecular compounds); sbornik statey. Moscow, Izd-vo "Nauka," 1963, 134-138

TOPIC TAGS: polymer, aromatic polymer, polyazophenylene, fluorine containing polymer, polymer synthesis, heat resistant polymer, organic semiconductor, semiconducting polymer

ABSTRACT: Aromatic polymers (polyazophenylenes) (I) with an average molecular weight up to 4,000 or 4,500 were synthesized by reduction of 4,4'-biphenylbisdiazonium tetrafluoroborate with monovalent copper salts. The resultant polymers were in the form of dark cinnamon powders, showed significant thermal stability (retaining a glassy state even at 450C) and lost less than 10% of their initial weight at 500C in an inert atmosphere. Similarly to polymers synthesized earlier from the bisdiazonium chloride (II), the fluorine-containing polymers (I) had phenylene and azo groups. Infrared analysis, viscosimetric measurements and thermomechanical tests indicated that the length of polymer molecules with conjugated

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bonds is greater in I than in II. I produced EPR signals of higher intensity than II and exhibited higher magnetic susceptibility ($\chi \cdot 10^{-6} = 1.4$ CGSM at $H = 3500$ oersteds, as compared to $0.17-0.20$ CGSM). Electrical conductivity obeyed an exponential law and ranged from $10^{15} \text{ ohm}^{-1} \cdot \text{cm}^{-1}$ at room temperature to 10^{-11} at 125°C . Orig. art. has: 5 figures.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AN SSSR)

SUBMITTED: 10Sep62

ENCL: 00

SUB CODE: OC, MT

NO REF SOV: 010

OTHER: 002

Card 2/2

ACCESSION NR: AT4010617

S/3051/63/000/000/0334/0341

AUTHOR: Roginskiy, S. Z.; Berlin, A. A.; Sakharov, M. M.

TITLE: Catalytic activity of synthetic organic semiconductors with a system of conjugated double bonds

SOURCE: Kataliticheskiye reaktsii v zhidkoy faze. Trudy* Vsesoyuznoy konferentsii. Alms-Ata, 1963, 334-341

TOPIC TAGS: catalysis, organic catalyst, polymer catalyst, conjugated olefin, organic semiconductor catalyst, synthetic organic catalyst, heterogeneous catalysis, aromatic hydrocarbon oxidation, hydrogen peroxide decomposition

ABSTRACT: Until recently, only inorganic substances were used in laboratory and industrial heterogeneous catalysis. Inorganic catalysts, however, are markedly inferior in activity and selectiveness to enzymes, the natural organic biological catalysts. The authors conducted a study of the liquid phase catalytic decomposition of H_2O_2 and oxidation of aromatic hydrocarbons using copper polytetracyanoethylene, nonmetallic polytetracyanoethylene, copper polyphthalocyanins (PFM-1, 2, 3 and 4), a polyacrylonitrile-based polymeric semiconductor, a methyl- β -chlorovinylketone-based polymeric semiconductor, and two highly polymerized polyenes as catalysts. The synthesis, probable structure, electrical and

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ACCESSION NR: AT4010617

physical properties of these compounds are described in detail in Izvestiya AN SSSR, 9, 1689, 1950; DAN AN SSSR, 128, 312, 1959 and 135, 609, 1960; Vy*sokomolekulyarny*e soyedineniya, 4, 376 and 860, 1962; Khimiya i tekhnologiya polimerov, 7-8, 139, 1960; and Zhurnal Vsesoyuznogo khimicheskogo obshchestva, 5, 507, 1960. The catalytic tests were conducted in a double-walled water-jacketed container at constant temperature. The container was agitated at a rate of 500/min. The reaction rate was determined by the volume of oxygen evolved (in the decomposition of H_2O_2) or absorbed (in the oxidation of hydrocarbons), and the specific surface of the samples was determined volumetrically, by krypton adsorption. The tests showed extremely diversified catalytic properties for the semiconductors examined, the highest catalytic activity being shown by PFM-2 copper polyphthalocyanin; this activity, however, was only 1/5 to 1/7 as high as that of MnO_2 . Extensive discussion of the experimental data and some theoretical suggestions are included. "The polymeric semiconductor derived from polyacrylonitrile was supplied by the laboratory of B. A. Krentsel. The authors also thank A. N. Nesmevanov and M. I. Ry*binskaya for supplying the polymeric semiconductor derived from methyl- β -chlorovinylketone." Orig. art. has: 5 structural formulas, 1 table and 4 figures.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry, AN SSSR)

Card 2/3

S/138/63/000/003/004/008
A051/A126

AUTHORS: Berlin, A. A., Drozdovskiy, V. F., Liogon'kiy, B. I.

TITLE: Structuralizing of rubber under the effect of polyazophenylenes

PERIODICAL: Kauchuk i rezina, no. 3, 1963, 10

TEXT: Sulfurless vulcanization of rubbers is assumed possible on the basis of the comparatively low excitation energies in polyazophenylenes which, in turn, are expressed in their high reactivity. Experiments showed that polyazophenylene (PAPh) and methyl-substituted polyazophenylene (MPAPh) promote the thermal structuralizing of butadiene-styrene rubber CKC-30 APM (SKS-30 ARM) at 180 - 210°C, whereby MPAPh has a greater structuralizing effect than PAPh. The structuralizing effect is also maintained in the case of a carbon-black rubber mix. The polyazophenylenes were found to reduce the rate of thermal and thermo-oxidizing destruction of the SKS-30 ARM sulfurless vulcanizate. There is 1 figure.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR i Nauchno-issledovatel'skiy
Institut shinnoy promyshlennosti (Institute of Chemical Physics of
the USSR AS and Scientific Research Institute of the Tire Industry)

Card 1/1

BERLIN, A.A.; BASS, S.I.

"Matrix effects" during the activation of compounds having a conjugation system in the reaction inhibiting the oxidation processes. Izv. AN SSSR. Ser.khim. no.9:1652-1654 S '63.
(MIRA 16:9)

1. Institut khimicheskoy fiziki AN SSSR i Institut tonkoy khimicheskoy tekhnologii im. M.V.Lomonosova.
(Polymers) (Oxidation) (Inhibition (Chemistry))

VONSIATSKIY, V.A.; ASEYEV, Yu.G.; KASATOCHKIN, V.I.; BERLIN, A.A.

Spectral study of polyphenylene and its block copolymers with
p-diethynylbenzene. Izv. AN SSSR. Ser.khim. no.9:1654-1658
S '63. (MIRA 16:9)

1. Institut khimicheskoy fiziki AN SSSR i Institut goryuchikh
iskopayemykh.

(Phenylene group) (Benzene) (Spectrum analysis)

BERLIN, A.A.; BASS, S.I.

Effect of the polarity of oxidized substratum on the inhibiting activity of the compounds having a conjugation system. Izv. AN SSSR Ser.khim. no.10:1854-1856 0 '63. (MIRA 17:3)

1. Institut tankoy khimicheskoy tekhnologii im. M.V.Lomonosova i Institut khimicheskoy fiziki AN SSSR.

TER-GAZARYAN, E.L. [deceased]; BERLIN, A.A.; MACHINSKAYA, R.Ye.; NUBARYAN,
T.K.; OGANESYAN, Sh.S.; SAMUSEVA, I.S.

Oxidation of natural gasoline in the liquid phase under pressure.
Neftekhimiia 3 no.6:886-891 N-D '63. (MIRA 17:3)

1. Nauchno-issledovatel'skiy i proyektnyy institut khimii, Korovakan.

I 10705-63

ACCESSION NR: AP3002021

EPR/EWP(j)/EPF(c)/EWT(m)/BDS--ASD--Pa-L/Pe-L/Pr-L--RM/WH

S/0195/63/004/003/0431/0436

AUTHOR: Roginskiy, S. Z.; Berlin, A. A.; Golovina, O. A.; Dokukina, Ye. S.; Sakharov, M. M.; Cherkashina, L. G.

TITLE: Catalytic activity of copper polyphthalocyanines on the reaction rate of hydrogen peroxide decomposition

SOURCE: Kinetika i kataliz, v. 4, no. 3, 1963, 431-436.

TOPIC TAGS: copper polyphthalocyanines, hydrogen peroxide decomposition, electro-physical properties, catalytic activity

ABSTRACT: The catalytic effect of monomeric copper phthalocyanine and of a series of copper polyphthalocyanines with different electrophysical properties on the reaction rate of H_2O_2 decomposition in an aqueous solution at 20-52 degrees was investigated. Greatest activity, almost equal to that of MnO_2 , was obtained with copper phthalocyanines having the greater degree of polymerization, the greatest electrical conductivity at room temperature and the smallest energy of activation; smallest activity was with less developed polymers with smallest conductivity and greatest energy of activation. Under experimental conditions the Cu phthalocyanine monomer was practically inactive. These results confirm

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L 10705-63

ACCESSION NR: AP3002021

correlation between the electro-physical properties of Cu polyphthalocyanines and their catalytic activity. Orig. art. has: 2 tables, 3 figures, and 2 formulas.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics, Academy of Sciences SSSR)

SUBMITTED: 22May62

DATE ACQ: 12Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 005

OTHER: 002

ja/lu

Card 2/2

S/190/63/005/003/006/024
B101/B186

AUTHORS: Berlin, A. A., Liogon'kiy, B. I., Parini, V. P.

TITLE: Polymers with a system of conjugated bonds and heteroatoms in the conjugated chain. XXVI. Polyazophenyleneferrocenes

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 5, no. 3, 1963, 330-336

TEXT: Reaction of ferrocene with diphenyl-4,4'-bisdiazonium chloride at a molar ratio of 1:1 at 35 - 36°C in ether gave a precipitate which was separated by extraction with benzene into a soluble fraction I and in insoluble fraction II. At a molar ratio of 1:2 the fraction III, soluble in benzene, and the insoluble fraction IV were obtained. The substances I-IV are dark brown powders. The reaction of ferrocene with diphenyl-4,4'-bis-diazonium-3,3'-dicarboxylic dichloride in dilute sulfuric acid and in argon atmosphere at 20°C gave, at a ratio of 1:1, the insoluble compound V, at a ratio of 1:2, the insoluble compound VI, both black powders. I and III are soluble in almost all organic solvents, II and IV in dimethylformamide V and VI in alkali and in dimethylformamide. All substances can be pressed. The substances soluble in organic solvents form rigid films. The elementary analysis showed that in I and III 2-4 diphenyl groups are bound

Card 1/3

Polymers with a system of...

S/190/63/005/003/006/024
B101/B186

per 1 Fe atom, in II and IV 5 - 6 diphenyl groups, and in V and VI 4-5 diphenyl groups are bound. The molecular weight of the soluble substances was 1000 - 1400, that of the insoluble substances was much higher. A linear structure of the polymers with parallel arrangement of the polyphenylene groups and a small number of ramifications is concluded from the dependence of the viscosity on the concentration and from the analysis of the IR spectra. The double bonds of the cyclopentadienyl are conjugated with those of the phenylene groups. All polymers synthesized are paramagnetic and give an epr signal with $g = 2.00$, width 7 - 9 oe, and an intensity of $10^{15} - 10^{16}$ spins/g. The magnetic susceptibility ($\chi \cdot 10^6$) was +0.47 for II at 3500 oe, + 0.20 for IV, + 3.1 for V, and +0.9 for VI. The conductivity is at $10^{-16} - 10^{-10}$ ohm/cm, their temperature dependence corresponds to that of semiconductors. The substances insoluble in organic substances cannot be melted and are highly heat resistant in inert atmosphere. The weight loss at 400°C was ~2%, at 500°C ~4%, at 600°C ~7%, at 700°C ~8%. With oxygen access rapid oxidation sets in at 300°C. The elemental composition of the substances changes only little after heating at 700°C in inert atmosphere, the epr spectrum, however, widens somewhat, its intensity increases from 10^{19} to 10^{21} spins/g and χ increases to

Card 2/3

Polymers with a system of...

S/190/63/005/003/006/024
B101/B186

$100 \cdot 10^6$. There are 3 figures and 4 tables.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical
Physics AS USSR)

SUBMITTED: August 5, 1961

Card 3/3

S/190/63/005/003/013/024
B101/B186

AUTHORS: Barkalov, I. M., Berlin, A. A., Gol'danskiy, V. I., Kuo Min-kao

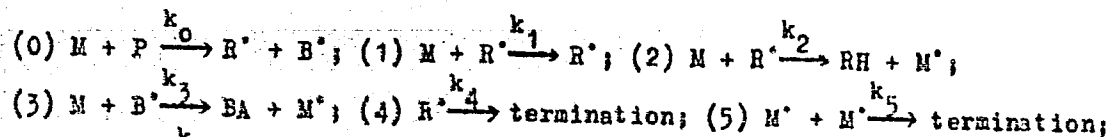
TITLE: Kinetics of phenylacetylene polymerization initiated with benzoyl peroxide

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 5, no. 3, 1963, 368 -372

TEXT: The decomposition of benzoyl peroxide (BP) in phenylacetylene (PA) was studied in the absence of oxygen at 60 - 80°C by iodometrically determining the remaining BP, by titrating the benzoic acid formed and by cryoscopically determining the molecular weight of the polymer formed. The concentration of the components dissolved in benzene was 1.72 - 9.11 mole/l PA, 0.0137 - 0.0840 mole/l BP. It has been found that the polymerization stops at a low degree of conversion, that the decomposition of BP in PA takes place more rapidly than in vinyl monomers, and that the reaction is of first order with respect both to PA and to BP. The maximum yield of poly-PA is directly proportional to the BP concentration where 6.8 mole PA are polymerized per mole BP. The molecular weight of the polymer was 730. The activation energy of polymerization is 21 ± 1 kcal/mole. Hence the following reaction order is suggested for the polymerization process:
Card 1/2

Kinetics of phenylacetylene...

S/190/63/005/003/013/024
B101/B186



(6) $R^\cdot + R^\cdot \xrightarrow{k_6} \text{termination}$. M is the monomer, P is benzoyl peroxide, R^\cdot is the polymer radical, B^\cdot the benzoyl radical, BA benzoic acid. Since $[R^\cdot] \ll [M]$ reaction (6) and reaction (4) can be neglected. $W = (3 + k_1/k_2)k_0[M][P]$ holds for the reaction rate, $\nu = 3 + k_1/k_2$ for the chain length, from which it follows that at $\nu \approx 7$, $k_1/k_2 = 4$. Conclusions: In the radiation polymerization studied earlier (Vysokomolek. soyed., 2, 1103, 1960) as well as in the peroxide-initiated polymerization the same mechanisms are active, which is obviously a characteristic feature of the polymerization of acetylene hydrocarbons. There are 5 figures and 2 tables.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AS USSR)

SUBMITTED: August 18, 1961

Card 2/2

BERLIN, A.A.; KASATOCHKIN, V.I.; ASEYEVA, R.M. ; FINKEL'SHTEYN, G.B.

Polymers with conjugated bonds and heteroatoms in the conjugate chain.
Part 29: Preparation and properties of the polymeric products of de-
hydrochlorination and carbonization of polyvinyl chloride and chlorinated
polyvinyl chloride. Vysokom.soed. 5 no.9:1303-1308 S '63.

(MIRA 17:1)

1. Institut khimicheskoy fiziki AN SSSR.

BERLIN, A.A.; VAYNSHTEYN, E.F.; CHERKASHIN, M.I.; MOSHKOVSKIY, Yu.Sh.

Polymers with a conjugate bond system in macromolecular chains. Part
32: Preparation and properties of 1-polyhexyne. Vysokom.soed. 5 no.9:
1354-1359 S '63. (MIRA 17:1)

1. Institut khimicheskoy fiziki AN SSSR.

EL'TSEFON, B.S.; BERLIN, A.A.

Mechanochemistry of polymers. Part 14: Role of the concentration of acoustic energy in the ultrasonic degradation of polymers in a solution. Vysokom. soed. 5 no.10:1562-1567
0 '63. (MIRA 17:1)

1. Institut khimicheskoy fiziki AN SSSR.

BERLIN, A. I.

Study in the field of mechanochemistry of polymers: some
biological problems in the mechanochemistry of natural poly-
mers. Biofizika 8 no.1:28-33 '83. (MIR 17:8)

L. Institut khimicheskoy fiziki AN SSSR, Moskva.

BERLIN, A.A. (Moskva); MATVEJEVA, N.G. [Matveyeva, N.G.] (Moskva);
CERKASINA, L.G. [Cherkashina, L.G.] (Moskva); SERLE, A.I.
[Sherle, A.I.] (Moskva).

Synthesis of polymers with heteroatoms and atoms of metals
in a molecular chain and some of their properties. Chem prum
13 no.11:601-605 N'63.

SHMURAK, I.L.; UZINA, R.V.; BERLIN, A.A.

Some characteristics connected to the use of vinylpyridine latexes for the impregnation of tire cord. Kauch. i rez. 22 no.6:27-29 Je '63. (MIRA 16:7)

1. Nauchno-issledovatel'skiy institut shinnoy promyshlennosti.
(Resins, Synthetic) (Tire fabrics)

POPOVA, Z.V.; BERLIN, A.A.; YANOVSKIY, D.M.

Synergism during polyvinyl chloride stabilization. Zhur.
prikl. khim. 36 no.5:1091-1096 My '63. (MIRA 16:8)

(Vinyl compound polymers) (Inhibition (Chemistry))

S/076/63/037/003/016/020
B101/B215

AUTHORS: Bass, S. I., Zil'berbrandt, A. M., Berlin, A. A.

TITLE: Study of the mechanism for the inhibiting action of compounds containing a system of conjugate bonds on thermal oxidation of low-molecular and polymer hydrocarbons. I. Inhibiting action of acenes on the oxidation of paraffin hydrocarbons

PERIODICAL:: Zhurnal fizicheskoy khimii, v. 37, no. 3, 1963, 682-685

TEXT: This is a report on the inhibiting action of anthracene, naphthacene, and pentacene on the oxidation of cetane and ceresin at 160 and 200°C. The following data are given for the adsorption rate of oxygen in the presence of 8 mmols/kg of acene in % of the adsorption rate without inhibitor: naphthacene 90 at 160°C, 55 at 200°C, pentacene 65 at 160°C, 78 at 200°C. At 160°C the length of the induction period is affected in the sequence anthracene < naphthacene < pentacene. These results are explained on the basis of energy changes in singlet-triplet transitions. Oxidation is accompanied by the formation of quinones which can be proved
Card 1/2

Study of the mechanism for the ...

S/076/63/037/003/016/020
B101/B215

spectroscopically and which also inhibit oxidation. There are 3 figures and 1 table.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im.
M. V. Lomonosova (Moscow Institute of Fine Chemical
Technology imeni M. V. Lomonosov)

SUBMITTED: May 26, 1962

Card 2/2

ROGINSKIY, S.Z.; ~~BERLIN~~, A.A.; KUTSEVA, L.N.; ASEYEVA, R.M.; CHERKASHINA,
L.G.; ~~SHERLE~~, A.I.; MATVEYEVA, N.G.

Catalytic properties of organic polymers with a system of conjugated bonds. Formation of hydroperoxides by the oxidation of alkyl aromatic hydrocarbons and cyclohexane. Dokl. AN SSSR 148 no.1:118-121 Ja '63.
(MIRA 16:2)

1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen-korrespondent AN SSSR (for Roginskiy).
(Hydrocarbons) (Hydroperoxides)
(Conjugation (Chemistry))

45155

S/020/63/148/002/028/037
B117/B186

AUTHORS:

Lipatova, T. E., Berlin, A. A.

TITLE:

Carbonium polymerization of polyacrylic acid esters

PERIODICAL:

Akademiya nauk SSSR. Doklady, v. 148, no. 2, 1963,
353-356

TEXT: The carbonium polymerization of polyacrylic acid esters in vacuo was studied at $20 \pm 0.1^\circ\text{C}$ in the presence of ~ 0.4 moles/l titanium tetrachloride. Formation and properties of the following β -polymers were investigated: MCF-9 (MCF-9) dimethacrylate(bis-triethylene glycol)-phthalate, TMCF-11 (TMCF-11) tetramethacrylate(bis-glycerin)-phthalate, and MDF-2 (MDF-2) dimethacrylate-diethylene glycolphthalate. MDF-2 yielded the largest amount of β -polymer (up to 40%), and TMCF-11 yielded the lowest (5-8%). β -polymers are able to convert spontaneously into infusible three-dimensional polymers, in air as well as in vacuo. Their properties differ considerably from those of three-dimensional polymers obtained by radical polymerization of polyacrylic acid ester. The analysis of IR spectra and thermo-mechanical studies showed that the three-

Card 1/2

Carbonium polymerization of ...

S/020/63/148/002/028/037
B117/B186

dimensional polymers obtained by carbonium polymerization are unsaturated. MGF-9, TMGF-11, and MDF-2 type β -polymers are suitable for the production of elastic coatings for glass, metal and ceramics, which are stable against numerous aggressive media. These polymers, which harden under the action of atmospheric oxygen, do not require the use of hardeners. From concentrated solutions of β -polymers in mixed solvents fibers can be formed which cross-link in air and assume a three-dimensional structure after being shaped and stretched. There are 3 figures and 1 table.

ASSOCIATION:

Institut obshchey i neorganicheskoy khimii Akademii nauk BSSR (Institute of General and Inorganic Chemistry of the Academy of Sciences BSSR); Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED:

January 18, 1962, by V. N. Kondrat'yev, Academician

SUBMITTED:

January 15, 1962

Card 2/2

DUDINA, L.A.; BERLIN, A.I.; KARMILOVA, L.V.; YENIKOLOPYAN, N.S.

Change of molecular weight in the oxidative degradation of
polyformaldehyde. Dokl. AN SSSR 150 no.3:580-583 My '63.
(MIRA 16:6)

1. Institut khimicheskoy fiziki AN SSSR. Predstavleno
akademikom N.N. Semenovym.
(Formaldehyde) (Oxidation)
(Molecular weights)

KARGIN, V.A., akademik; NEYMAN, M.B., prof.; BUCHACHENKO, A.L.,
kand. khim. nauk; MIKHAYLOV, V.V.; MASLOVA, I.P.;
LUKOVNIKOV, A.F., kand. khim. nauk; MATVEYEVA, Ye.N.;
~~BERLIN, A.A.~~, prof.; YANOVSKIY, D.M., kand. khim. nauk;
POPOVA, Z.V., kand. khim. nauk; LEVANTOVSKAYA, I.I.;
KOVARSKAYA, B.M., kand. khim. nauk; ANDRIANOV, K.A., prof.;
KUZ'MINSKIY, A.S., prof.; SLONIMSKIY, G.L., prof.; MAKUNI,
Ye.B., tekhn. red.

[Aging and stabilization of polymers] Starenie i stabili-
zatsiia polimerov. Moskva, Izd-vo "Nauka," 1964. 330 p.
(MIRA 17:3)

1. Akademiya nauk SSSR. Institut khimicheskoy fiziki.
2. Chlen-korrespondent AN SSSR (for Andrianov).

L 12412-63

Pt-4 RM/WW

EWP(j)/EPT(o)/EWT(m)/ES(s)-2/BDS ASD/ESD-3/SSD Pc-4/Pr-4/

ACCESSION NR: AP3001402

S/0020/63/150/004/0795/0798

AUTHOR: Berlin, A. A.; Bass, S. I.

TITLE: Local activation of compounds with conjugated system in inhibition reactions of oxidizing processes

SOURCE: AN SSSR. Doklady, v. 150, no. 4, 1963, 795-798

TOPIC TAGS: activated anthracene, paraffins

ABSTRACT: In an earlier work (S. I. Bass, A. I. Zilberbrand, A. A. Berlin, Zh. fiz khimii, no. 3, 1963), it was established that higher acenes (naphthacene, pentacene) contain paramagnetic particles and that anthracene does not show electrical paramagnetic resonance. It was assumed that this effect was a result of the local activation of the compounds with a conjugated system of paramagnetic particles formed during their synthesis. It was assumed that the activation products of anthracene containing paramagnetic particles will be more effective acceptors of free radicals and, therefore, of inhibitors of radical chain reactions. This assumption was investigated through a stepwise addition of paramagnetic particles to the activated anthracene. The correlation between the paramagnetic particles in the activated anthracene and its inhibiting ability of thermo-oxidation of paraffins was also investigated. Similar results were

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L 12412-63

ACCESSION NR: AP3001402

obtained with some polymers with conjugated bonds such as polyphenylacetylene. The results showed that an optimum concentration of paramagnetic particles exists in relation to the inhibiting properties of activated anthracene. Also, the activation is valid in cases where the activating and activated compounds are closely related in their chemical structures. "We express our gratitude to S. S. Medvedev for his assistance and valuable hints in the explanations of the obtained results." Orig. art. has: 1 table and 4 graphs.

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova (Moscow Institute of Fine Chemical Technology)

SUBMITTED: 15Feb63

DATE ACQ: 01Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 005

OTHER: 003

Curd 2/2

VONSYATSKIY, V.A.; KALYAYEV, G.I.; BERLIN, A.A.

Kinetics of interaction between polyphenylene and 1,1-diphenyl-2-picrylhydrazyl. Izv.AN SSSR.Ser.khim. no.2:304-309 F '64.
(MIRA 17:3)

1. Institut khimicheskoy fiziki AN SSSR.

ACCESSION NR: AP4025013

S/0062/64/000/003/0568/0569

AUTHORS: Berlin, A. A.; Cherkashin, M. I.

TITLE: Paramagnetism of polymers with pi-conjugated systems

SOURCE: AN SSSR. Izv. Seriya khimicheskaya, no. 3, 1964, 568-569

TOPIC TAGS: polymer, acetylenic polymer, pi conjugated system, paramagnetism, diamagnetism, EPR signal, phenylacetylene polymer, iodo-phenylacetylene polymer, tert. butylacetylene polymer, pentyne polymer, hexyne polymer, hydrogenation, bromination, oxygen addition, double radical, ion radical

ABSTRACT: The paramagnetism of acetylenic polymers was investigated in an effort to explain the phenomenon. Phenylacetylene, beta-iodophenylacetylene and t-butylacetylene (molecular weights 5000-7000) obtained on the Ziegler-Natta catalyst ($(C_2H_5)_3Al \cdot TiCl_3$ and $(C_2H_5)_3AlTiCl_4$ at -20 to 70C) show a narrow singlet with 10^{16} to 10^{18} paramagnetic particles per gram, while pentyne-1 and hexyne-1 polymers obtained under analogous conditions (molecular weights 40,000-

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Y
ACCESSION NR: AP4025013

80,000) are diamagnetic. Partial hydrogenation of polyphenylacetylene on Ni-Al catalyst causes a transition from paramagnetism to diamagnetism; bromination decreases the EPR signal by one order. The hydrogenated polyphenylacetylene will add oxygen on standing in air, while the original paramagnetic polyphenylacetylene is stable with respect to oxygen even at 250-300C. Bromination apparently occurs either at the paramagnetic centers or at double bonds in individual molecules causing delocalization of the pi-electrons. It is proposed that in systems containing pi-conjugations, the EPR signal is associated with the presence of a fraction of high molecular weight homologs existing in the form of double radicals or ion radicals. Orig. art. has: 00

ASSOCIATION: Institut khimicheskoy fiziki, AN SSSR (Institute of Chemical Physics, AN SSSR)

SUBMITTED: 23Aug63

DATE ACQ: 17Apr64

ENCL: 00

SUB CODE: PH, CH

NR REF SOV: 009

OTHER: 000

Card 2/2

10-10-1940(c) 141 # 1 14-1-12
14033384

10-10-1940(c) 141 # 1 14-1-12

10-10-1940(c) 141 # 1 14-1-12

10-10-1940(c) 141 # 1 14-1-12

10-10-1940(c) 141 # 1 14-1-12

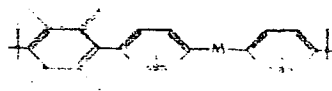
10-10-1940(c) 141 # 1 14-1-12

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10-10-1940(c) 141 # 1 14-1-12



Form 100-10 (Rev. 2-10-63) 2 tables

Submitted 210-63

ENCL: 00

100

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ACCESSION NR: AP4033387

S/0062/64/000/004/0705/0709

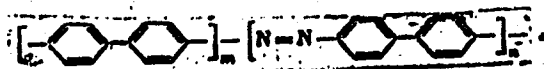
AUTHOR: Berlin, A. A.; Liogon'kiy, B. I.; Parin, V. P.

TITLE: Polymers with a conjugated system. Communication 56.
Synthesis and study of the properties of a polymer based on
bis(nitrosoacetyl)benzidine

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 4, 1964,
705-709

TOPIC TAGS: organic semiconductor, semiconducting polymer, poly-
azophenylene, polyazophenylene preparation

ABSTRACT: A polymer containing aromatic rings and azo groups in the
backbone has been prepared by the decomposition of N,N'-dinitroso-
N,N'-diacetylbenzidine in benzene:



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ACCESSION NR: AP4033387

The reaction was carried out under argon at 40—45C for 4 hr, then at the boiling point of benzene for 4 more hr; nitrogen evolved and the polymer precipitated. The polymer is partly soluble in aniline, pyridine, quinoline, and dimethylformamide, and is completely soluble in concentrated sulfuric acid. Decomposition in air begins at 500C. IR and EPR spectra, concentration dependence of reduced viscosity in 98% H₂SO₄, magnetic susceptibility, and thermomechanical curves were measured, and thermogravimetric analysis was performed for the polymer and compared with similar data for polyazophenylene prepared by reduction of 4,4'-biphenylbis(diazonium chloride) with cuprous salts. The fact that the new polymer prepared in the absence of metal showed an EPR signal and paramagnetism was regarded as confirming that these effects are due not to the presence of impurities but to the formation during the synthesis of a homologous polymer fraction of stable biradicals and charge transfer complexes. The temperature dependence of electrical conductivity obeyed an exponential law; σ_0 equals $10^{-3} \text{ ohm}^{-1} \cdot \text{cm}^{-1}$, E equals 1.01 ev. At 125C, the electrical conductivity is $10^{-10} \text{ ohm}^{-1} \cdot \text{cm}^{-1}$. Orig. art. has: 3 figures and 3 formulas.

ASSOCIATION: Institut khimicheskoy fiziki, Akademi nauk SSSR (Institute of Chemical Physics, Academy of Sciences, SSSR)

Card 2/3

ACCESSION NR: AP4033387

SUBMITTED: 16Oct62

DATE ACQ: 15May64

ENCL: 00

SUB CODE: CH, PH

NO REF SOV: 007

OTHER: 005

Card 3/3